

## Dielectric substance with block effect preventing copper diffusion

**Patent number:** CN1468839

**Publication date:** 2004-01-21

**Inventor:** SETS R (DE); VALT A (DE); MATANBEG A (DE)

**Applicant:** INFINEON TECHNOLOGY AG (DE)

**Classification:**

- **international:** C07C235/70; C07D207/14; C07D207/24; C07D209/00;  
C07D213/75; C07D215/38; C07D239/42; C07F7/08;  
C08G73/22

- **european:**

**Application number:** CN20030145283 20030627

**Priority number(s):** DE20021028770 20020627

**Also published as:**



EP1375559 (A1)



US6806344 (B2)



US2004063895 (A)



JP2004068005 (A)



DE10228770 (A1)

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Abstract not available for CN1468839

Abstract of corresponding document: US2004063895

Novel poly-o-hydroxyamides can be cyclized to give polybenzoxazoles which have a good diffusion barrier effect with respect to metals. The poly-o-hydroxyamides can be applied to a semiconductor substrate by customary techniques and converted into the polybenzoxazole in a simple manner by heating. This results in a good barrier layer with respect to diffusion of metals. This allows the diffusion barrier between conductor track and dielectric to be substantially dispensed.

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Attorneys at Law

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April 25, 2005

Dr. Dieter Kottmann  
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 Germany

**FACSIMILE TRANSMISSION**

**Confirmation by mail**  
 Total 5 pages

1. tele  
 2. SV

Re: China Patent Application for Invention No. 03145750.9  
 Entitled "Insulation Material For Aluminum And Copper  
 Metalizations" based on German Patent Application No.  
 102 28 769.4 filed June 27, 2002

In the name of Infeneon Technology AG

Inventor(s): Recai SEZI; Andreas WALTER; Anna  
 MALTENBERGER; Klaus LOWACK; Marcus HALIK GEGANGEN

Your Ref.: 12682

Our Ref.: PIECIA15428/185-gwen

12686

25. Mai 2005

MULLER • HOFFMANN & PARTNER

26. April 2005

Prist .....

18. Mai 2005

27. Mai 2005

Dear Dr. Kottmann:

Please be advised that we have received the First Office Action for the above-captioned application transferred from the Chinese associate. Please find enclosed a copy of the First Office Action together with its English translation for the above-captioned application. A response to this Action should be submitted to the China State Intellectual Property Office on or before July 19, 2005. The Chinese associate hopes to have our further instructions before July 4, 2005.

The opinions raised by the Examiner could be seen in the attached English Translation of the Action. By the way, an electronic copy of this letter will be forwarded to you via e-mail (mail@mh-patent.de). **Please kindly acknowledge safe receipt of this letter by return fax or E-Mail.**

Regarding item 1, the Examiner objects to Claim 1 since the definitions of each group thereof are not supported by the examples disclosed in the specification, and one skilled in the art cannot anticipate whether all polymers recited therein have the good performance. According to the specification, the structural units M<sup>1</sup>, M<sup>2</sup>, M<sup>3</sup>, M<sup>4</sup>, M<sup>5</sup> and M<sup>6</sup> can be randomly distributed in the polymer, and it is believed that one skilled in the art could carry out the

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Patent Attorneys

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polymer accordingly. Hence, we could argue this with the Examiner. In addition, it is appreciated that you provide us with your other possible wonderful technical comments and instructions. As to the objection regarding the performance of each polymer, we do not agree. It is believed that the good solubility in organic solvents and the good film formation properties of the poly-O-hydroxyamide should be well known. We will argue against the Examiner in these respects.

Regarding item 2(1), the Examiner objects to Claim 1 since the "aryl group", the "heteroaryl group", the "alkylene group", the "arylene group" and the "cycloalkylene group" defined in R<sup>2</sup>-R<sup>4</sup>, R<sup>6</sup> or R<sup>8</sup> do not clearly define the numbers of the carbon atoms, and also, the recitation "...substituted..." thereof does not further define the substantial substituted groups. Since a broad scope of a compound without well support from the specification would be generally unacceptable by some Examiners, it is suggested to provide some explanation to clarify how the groups presented in Claim 1 could well supported by the embodiments or to limit those groups in Claim 1 to a reasonable scope or to supplement more embodiments to support the protecting scope of the Claimed compound, if available. Please provide us with your wonderful opinions of how you would like to amend the claim.

Regarding item 2(2), the Examiner objects to Claim 1 since the definition of A in Claim 1 is alleged to be unclear and not fully supported by the specification. As to the recitation of "A, if a=0 and/or f=1, is...", it is believed that it limits A in the conditions of 1) "if a=0 and f=1" or 2) "if f=1", and the recitation of "A, if a=1 and/or f=0, is..." limits A in the conditions of 1) "if a=1 and f=0" or 2) "if f=0". If you agree with this, we will argue against the Examiner based thereon. For preferring a more powerful response, it is appreciated that you provide us with your any additional wonderful technical comments and instructions.

Regarding item 2(3), the Examiner objects to Claim 4 since the recitation of the polymer "polybenzoxazole" is defined by its reaction materials rather than its structural features. According to the requirements of Paragraph 1 of Rule 20 of the Implementing Regulations of the China Patent Law, the technical features of an invention application should be recited in Claims, it is suggested to revise Claim 4 with the structural technical features, such as what is recited in Claim 1. Please provide us with your potential wonderful opinions as to how you would like

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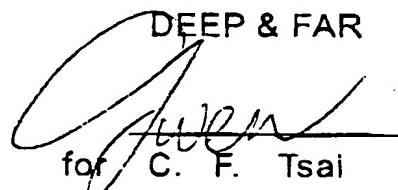
to amend the claim. Since objections of Claims 5, 7-8 and 9-10 are derived from the fact that these Claims are independent Claims directly or indirectly presented by the quotation form of Claim 4, it would be allowable after the objection of Claim 4 is overcome. Otherwise, please provide us with your wonderful opinions as to how you would like to amend these claims if you would like to do so.

As to item 2(4), we will take care of it.

In order to have a timely response, please let us you're your instructions and/or comments on this Office Action preferably by June 25, 2005 in order that we can act accordingly. Should there exist any question, please feel free to contact us immediately.

Very truly yours,

DEEP & FAR



for C. F. Tsai

CFT/gwen

- Encl. 1. a copy of the First Office Action and English translation thereof  
2. a copy of the letter from China H.K. associate  
3. a reference document

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### **English Translation of the First Office Action**

(Issued to China Patent Application No. 03145750.9)

After examination, there are defects in the present application, wherein Claim 1 does not comply with Paragraph 4 of Article 26 of the China Patent Law. Claims 1, 4-5 and 7-8 do not comply with Rule 20 of the Implementing Regulations of the China Patent Law.

#### **The First Office Action**

The present application relates to the insulation materials for aluminum and copper metalizations. After examining, the examination opinions are provided as follows:

**1. Claim 1 does not comply with Paragraph 4 of Article 26 of the China Patent Law.** Claim 1 claims a poly-o-hydroxyamide of the formula I, however the definition of each group thereof can not be well supported by the technical features disclosed in the specification. There only disclose examples of polymers prepared by the materials described on Pages 17-20 of the specification. In addition, in Claim 1, the definitions of the z and the Y groups comprise plenty of groups with a great diversity of the structures, where certain differences exist among the properties thereof. Consequently, the differences/diversities of the structure and the properties will determine whether the final polymer are produced and have the great performances. A poly-o-hydroxyamide with it's formula very similar to what is recited in the present Application is also claimed in the other patent application (CN-1468839A) of the Applicant, wherein a particularly selective limitation of the  $Y^2$  group are recited for gaining a new group of polymers with good performances. This proves that it is necessary to take the creative works for the selection of the particular groups of the polymer. According to the examples provided in the specification, one skilled in the art cannot anticipate that all polymers recited in Claim 1 have the good performance. The Applicant should define each groups of Claim 1 in a reasonable scope based on those materials of the claimed compounds on Pages 17-20 of the specification.

**2. Claims 1, 4-5 and 7-8 do not comply with Rule 20 of the Implementing Regulations of the China Patent Law.**

(1) The "aryl group", "heteroaryl group", "alkylene group", "arylene group" and "cycloalkylene group" defined in  $R^2-R^4$ ,  $R^6$  and

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**2. Claims 1, 4-5 and 7-8 do not comply with Rule 20 of the Implementing Regulations of the China Patent Law.**

**(1) The "aryl group", "heteroaryl group", "alkylene group", "arylene group" and "cycloalkylene group" defined in R<sup>2</sup>-R<sup>4</sup>, R<sup>6</sup> and**

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R<sup>8</sup> of Claim 1 do not clearly recite the numbers of the carbon atoms. Also, the recitation "...substituted..." therein does not further define the substantial substituted groups. Therefore, the protecting scope is unclear.

(2) The definition of A in Claim 1 recites "A, if a=0 and/or f=1, is..." and "A, if a=1 and/or f=0, is...", wherein the recitation "and/or" makes the protecting scope unclear. How to define A while the condition is "a=0 and f=0" or "a=1 and f=1"? Furthermore, according to the corresponding descriptions in the specification, only the "or" conditions are provided (referring to Page 13, Lines 12-13 of the specification).

(3) Claim 4 for recites a polybenzoxazole obtained from a poly-o-hydroxyamide of the formula I. Firstly, for the polymer "polybenzoxazole", it should be limited by its structural features rather than the reaction material. Second, according to the disclosure of the present specification, the polymer of the formula I is obtained first, and then the polybenzoxazole are formed by the heating process during the performance tests for the polymer of the formula I. However, there are no features of the polybenzoxazole described in the specification. Therefore, the Applicant should delete Claim 4. Claims 7-8 are directly quote Claim 4, and thus the protecting scopes of Claims 7-8 are also unclear. Furthermore, Applicant should also amend the quotation relationships of Claims 9-10 based on the amendments of the above Claims.

(4) The word "的" in the recitation "或的" on Line 21 of Claim 5 is unnecessary, and it should be deleted. In addition Claim 5 should be more clearly recited as "a process for the preparation of a poly-o-hydroxyamide of the formula I as claimed in Claim 1".

According to the above examining opinions, this application based on the present texts shall not be granted patent rights. In accordance with the above reasons, the Applicant should submit the amended Claims and specification according to the examination opinions on or before the deadline set in this Office Action for speeding up the Examination process.

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**中国专利代理(香港)有限公司**  
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(IP7241)

Date: March 12, 2005

Re: Chinese Patent Application for Invention No. 03145750.9

In the name of INFINEON TECHNOLOGIES AG.

Title: ISOLIERMATERIAL FUER ALUMINIUM UND KUPFERMETALLISIERUNGEN

Your Ref: PIECLA15428/185

**DEEP & FAR**

Our Ref: CPCH0361718

MAR 23 2005

**Received**

尊敬的女士、先生:

我们已经收到了国家专利局于 2005 年 3 月 4 日签发的第一次审查意见通知书。答复该通知书的期限为 2005 年 7 月 19 日 (仅可延期一次, 延期两个月或者一个月)。为了按时答复, 我们希望在 2005 年 7 月 4 日或之前收到您有关答复本次审查意见的具体指示。随信寄去上述审查意见通知书 (包括表格函和审查意见通知书正文) 以及审查员引用的对比文献 (CN1468839A)。

下面依据审查意见通知书正文的顺序给出我们的意见和建议:

1. 审查员引用申请人的另一申请 CN1468839A 中仅对 Y<sup>2</sup> 作了选择性限定就得到了一类新的具有良好性能的聚合物, 从而认为本申请的权利要求 1 得不到说明书的支持。按照目前的审查实践, 一般认为, 如果权利要求的范围是对说明书具体实施例的合理概括, 那么就可以认为该权利要求能够得到说明书的支持。因此, 我们建议按照以下原则修改权利要求: 删掉那些得不到具体实施例支持并且与实施例具体公开的基团性能相差较远的基团。
2. (1) 我们建议根据说明书的公开, 用碳原子数限定权利要求 1 中的“芳基”、“杂芳基”、“亚烷基”等, 并根据说明书的公开限定取代基 (“取代的亚烷基”被认为包括了被所有可能的取代基取代的亚烷基, 从而得不到说明书的支持)。  
(2) 审查员认为所述定义不清楚并且与说明书不一致。请申请人给出具体意见。  
(3) 审查员认为申请人应该删除权利要求 4 并相应修改后面的权利要求。我们认为申请人可以先陈述意见或者对其进行修改 (比如改成式 I 的多-邻-羟基酰胺

的应用), 如果审查员仍不接受, 可在下一次删除。(4) 我们将删除多余的“的”字; 关于权利要求 5 的方法, 我们在说明书中没有找到更具体的描述, 而用实施例限定范围又太小, 所以建议争辩。请申请人给出具体意见。

我们希望上述建议对申请人给出答复本次审查意见的具体指示有所帮助。如果申请人有其他问题, 请随时与我们联系。

Very truly yours,



LI Liantao, Ph. D

Patent Attorney

Chemical Department

China Patent Agent (H.K.) Ltd.

/llt

Enclosure

## 中华人民共和国国家知识产权局

邮政编码: 100032

北京市西城区金融街 27 号投资广场 B 座 19 层

中国专利代理(香港)有限公司

谭明胜, 马崇德

发文日期



申请号: 031457509



申请人: 因芬尼昂技术股份公司

发明创造名称: 铝和铜金属化的绝缘材料

0361718

## 第一次审查意见通知书

1.  应申请人提出的实审请求, 根据专利法第 35 条第 1 款的规定, 国家知识产权局对上述发明专利申请进行实质审查。  
 根据专利法第 35 条第 2 款的规定, 国家知识产权局决定自行对上述发明专利申请进行审查。
2.  申请人要求以其在:

DE 专利局的申请日 2002 年 06 月 27 日为优先权日,  
 专利局的申请日 年 月 日为优先权日,  
 专利局的申请日 年 月 日为优先权日,  
 专利局的申请日 年 月 日为优先权日,  
 专利局的申请日 年 月 日为优先权日。

申请人已经提交了经原申请国受理机关证明的第一次提出的在先申请文件的副本。

申请人尚未提交经原申请国受理机关证明的第一次提出的在先申请文件的副本, 根据专利法第 30 条的规定视为未提出优先权要求。

3.  经审查, 申请人于:

年 月 日提交的	不符合实施细则第 51 条的规定;
年 月 日提交的	不符合专利法第 33 条的规定;
年 月 日提交的	

19 JUL 2005

4. 审查针对的申请文件:

原始申请文件。  审查是针对下述申请文件的

申请日提交的原始申请文件的权利要求第

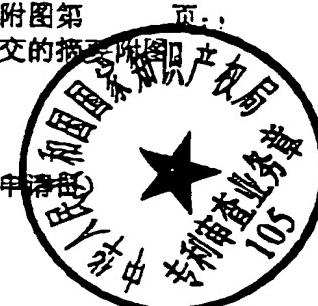
年 月 日提交的权利要求第	项、说明书第	页、附图第	页:
年 月 日提交的权利要求第	项、说明书第	页、附图第	页:
年 月 日提交的权利要求第	项、说明书第	页、附图第	页:
年 月 日提交的权利要求第	项、说明书第	页、附图第	页:
年 月 日提交的说明书摘要,	年 月	日提交的摘要附图	页:

5.  本通知书是在未进行检索的情况下作出的。

本通知书是在进行了检索的情况下作出的。

本通知书引用下述对比文献(其编号在今后的审查过程中继续沿用):

编号	文件号或名称	公开日期 (或抵触申请的申请日)
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6. 审查的结论性意见:

关于说明书:

申请的内容属于专利法第 5 条规定的不授予专利权的范围。

说明书不符合专利法第 26 条第 3 款的规定。

申请号 031457509

- 说明书不符合专利法第 33 条的规定。  
 说明书的撰写不符合实施细则第 18 条的规定。

 关于权利要求书:

- 权利要求 不具备专利法第 22 条第 2 款规定的新颖性。  
 权利要求 不具备专利法第 22 条第 3 款规定的创造性。  
 权利要求 不具备专利法第 22 条第 4 款规定的实用性。  
 权利要求 属于专利法第 25 条规定的不授予专利权的范围。  
 权利要求 1 不符合专利法第 26 条第 4 款的规定。  
 权利要求 不符合专利法第 31 条第 1 款的规定。  
 权利要求 不符合专利法第 33 条的规定。  
 权利要求 不符合专利法实施细则第 2 条第 1 款关于发明的定义。  
 权利要求 不符合专利法实施细则第 13 条第 1 款的规定。  
 权利要求 4-5、7-8 不符合专利法实施细则第 20 条的规定。  
 权利要求 不符合专利法实施细则第 21 条的规定。  
 权利要求 不符合专利法实施细则第 22 条的规定。  
 权利要求 不符合专利法实施细则第 23 条的规定。

上述结论性意见的具体分析见本通知书的正文部分。

## 7. 基于上述结论性意见, 审查员认为:

- 申请人应按照通知书正文部分提出的要求, 对申请文件进行修改。  
 申请人应在意见陈述书中论述其专利申请可以被授予专利权的理由, 并对通知书正文部分中指出的不符合规定之处进行修改, 否则将不能授予专利权。  
 专利申请中没有可以被授予专利权的实质性内容, 如果申请人没有陈述理由或者陈述理由不充分, 其申请将被驳回。

## 8. 申请人应注意下述事项:

- (1) 根据专利法第 37 条的规定, 申请人应在收到本通知书之日起的肆个月内陈述意见, 如果申请人无正当理由逾期不答复, 其申请将被视为撤回。
- (2) 申请人对其申请的修改应符合专利法第 33 条的规定, 修改文本应一式两份, 其格式应符合审查指南的有关规定。
- (3) 申请人的意见陈述书和/或修改文本应邮寄或递交国家知识产权局专利局受理处, 凡未邮寄或递交给受理处的文件不具备法律效力。
- (4) 未经预约, 申请人和/或代理人不得前来国家知识产权局专利局与审查员举行会晤。

## 9. 本通知书正文部分共有 1 页, 并附有下述附件:

引用的对比文件的复印件共 份 页。  参考资料 CN1468839A 共 12 页

审查员: 刘文霞(9421)

2005 年 2 月 6 日

审查部门 审查协作中心

中华人民共和国国家知识产权局

第一次审查意见通知书正文

申请号：031457509

本发明专利申请涉及铝和铜金属化的绝缘材料。经审查，现提供意见如下：

1. 权利要求1不符合专利法第二十六条第四款的规定。其请求保护一种式I的多-邻-羟基酰胺，但是其中关于各取代基团的定义超出说明书具体技术情报所支持的范围。说明书中只给出了使用第17页到20页中所列举的那些原料制备得到的聚合物的实例，而权利要求1中关于Z、Y等基团的定义中，却包含了大量的结构差异很大的基团，其在性质上也具有一定差异，而这些结构和性质上的差异必然会影响到聚合物最终是否能够生成并且具有所述的优良性能。在申请人的另外一份专利申请中（CN-1468839A），也请求保护了一种和本申请的聚合物结构非常类似的多-邻-羟基酰胺，只是对其中的Y<sup>2</sup>作了特别的选择性限定，从而得到了一类新的具有良好性能的聚合物。由此可见，对于聚合物中特定基团的选择，是要付出创造性的劳动的。本领域技术人员根据本申请中给出的实施例，并不能预测到权利要求1中包含的全部聚合物均能够具有所述的良好性能。申请人必须根据说明书第17-20页中列举的那些化合物原料，对各基团作出合理限定。

2. 权利要求1、4-5、7-8不符合专利法实施细则第二十条第一款的规定。

(1) 权利要求1中关于R<sup>2</sup>-R<sup>4</sup>、R<sup>6</sup>、R<sup>8</sup>定义中所述“芳基”、“杂芳基”、“亚烷基”、“亚芳基”、“亚环烷基”均未明确碳原子数目；所述“取代的”也没有进一步给出具体的取代基团，造成保护范围不清楚；

(2) 权利要求1中对A定义时，所述“若a=0和/或f=1，那么A为”、“若a=1和/或f=0，那么A为”中“和/或”的表述会造成保护范围不清楚。试问当“a=0且f=0”或者“a=1且f=1”时，A应该取哪一部分定义呢？况且根据说明书中相应记载，也只是“或”的关系（参见说明书第13页第12、13行）；

(3) 权利要求4请求保护一种由式I的多-邻-羟基酰胺得到的聚苯并噁唑。首先，对于聚苯并噁唑这一聚合物来说，应当用其结构特征进行限定，而不应该用反应原料进行限定；其次，根据本说明书中记载，均是首先制备得到式I的聚合物，在测试性能过程中再通过热处理得到聚苯并噁唑，并没有给出对于聚苯并噁唑的表征。因此，申请人只能删除该权利要求。权利要求7、8均直接引用到权利要求4，因此，保护范围也是不清楚的。申请人还应根据修改的上述权利要求对权利要求9和10中出现的引用关系作出修改。

(4) 权利要求5中第21行所述“或的”中的“的”多余，应删除。且应当明确为“权利要求1所述的式I的多-邻-羟基酰胺的制备方法”。

基于上述理由，以目前文本提交的本申请，不能被授予专利权。申请人应充分考虑上述意见，并于指定期限内提交修改的文本，则可望加速审查进程。

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